

TABLE 6- Stiffness modulus (psi)^a of asphalt paving mixtures at -23°C (- 10°F) and 20,000s loading time.

	Asphalt Type					
	T-1	T-5	T-4	T-2	T-6	T-3
Transverse cracking index (1983)	92	64	30	26	11	0
Air voids content (cores), % (7 years)	3.4	1.6	1.5	1.8	1.4	0.6
Diametral creep modulus (7 years)	1.9×10^6	255×10^6	2.0×10^6	1.65×10^6	1.25×10^6	1.35×10^6
McLeod Method						
After 7 years	2×10^6	1.65×10^6	1×10^6	8.4×10^5	5.1×10^5	5.1×10^5
Just after construction	1.15×10^6	1×10^6	8×10^5	4.8×10^5	3.4×10^5	4.4×10^5
Original asphalt	6.4×10^5	4.2×10^5	2.75×10^5	2.55×10^5	1.55×10^5	1.95×10^5

al psi = 6.895 kPa.

TABLE 7- Superpave binder test results.

TEST	Asphalt Type					
	T-1	T-2	T-3	T-4	T-5	T-6
<u>Original Binder:</u> Brookfield Viscosity at 135°C, Pas G*/sin<i>i</i> at 64°C, kPa	0.312 1.61	N/A 1.25	0.300 1.16	0.275 1.30	0.260 0.97	0.312 1.48
<u>RTFOT Residue:</u> G*/sin<i>δ</i> at 64°C, kPa	3.15	5.51	2.66	3.16	2.09	3.73
<u>PAV Residue:</u> G*/sin<i>δ</i> at 22°C, kPa	10,774	3,897 ^a	5,186	4,734	7,625	3,450
Lowest temperature meeting Superpave criteria (stiffness and m-value)	-1 8°C	-1 7°C ^b	-26°C	-23°C	-22°C	-28°C
PG Grade	64-16	64-16	64-22	64-22	58-22	64-28

^aMeasured at 19°C rather than 22°C.

^bExtrapolated.

TABLE 8. Bending beam rheometer test data on RTFOT residue

Performance Ranking Order	Cracking Index		Minimum Design Temperature					
			-34°C		-28°C		-22°C	
	4 months	7 years	Stiffness ^a (MPa)	m-Value	Stiffness ^a (MPa)	m-Value	Stiffness ^a (MPa)	m-Value
T-1 (Worst)	51	92	1191 ^b	0.133 ^b	800 ^b	0.202 ^b	346	0.300
T-5	38	64	881	0.172	473	0.258	251	0.350
T-4	0	30	520 ^b	0.230 ^b	280 ^b	0.284 ^b	138	0.347
T-2	0	26	370	0.248	202	0.302	95	0.325
T-6	0	11	458	0.268	236	0.334	92	0.398
T-3 (Best)	0	0	580 ^b	0.238 ^b	309 ^b	0.313 ^b	133	0.381

^aTwo-hour loading time^bAverage of two tests, remaining data are based on one test.

TABLE 9. Bending beam rheometer test data on PAV residues

Performance Ranking Order	Cracking Index (7 years)	Minimum Design Temperature					
		-34°C		-28°C		-22°C	
		Stiffness* (MPa)	m-Value	Stiffness ^a (MPa)	m-Value	Stiffness ^a (MPa)	m-Value
T-1 (Worst)	92	993	0.161	741	0.205	469	0.255
T-5	64	802	0.187	515	0.247	278	0.300
T-4	30	500	0.211	287	0.263	153	0.305
T-2	26	436	0.220	241	0.250	129	0.270
T-6	11	473	0.260	250	0.300	111	0.365
T-3 (Best)	0	591 ^b	0.224 ^b	326 ^b	0.281 ^b	160b	0.346 ^b

^aTwo-hour loading time^bAverage of two tests, remaining data are based on one test.

LIST OF FIGURES

- FIGURE 1. Hourly air and pavement temperature data (January 28-29, 1977)
- FIGURE 2. Asphalt T-1 in both lanes showing transverse cracking.
- FIGURE 3. Asphalt T-1 (foreground lane) and Asphalt T-2 (background lane).
- FIGURE 4. Asphalt T-5 in both lanes showing well-defined full and half-width transverse cracks.
- FIGURE 5. Asphalt T-5 (foreground lane) and Asphalt T-6 (background lane)
- FIGURE 6. Stiffness of RTFOT residues.
- FIGURE 7. m-Value of RTFOT residues.
- FIGURE 8. Stiffness and m-Value at -28°C of RTFOT residues.
- FIGURE 9. Stiffness of PAV residues.
- FIGURE 10. m-Value of PAV residues.
- FIGURE 11. Stiffness and m-Value at -34°C of PAV residues.

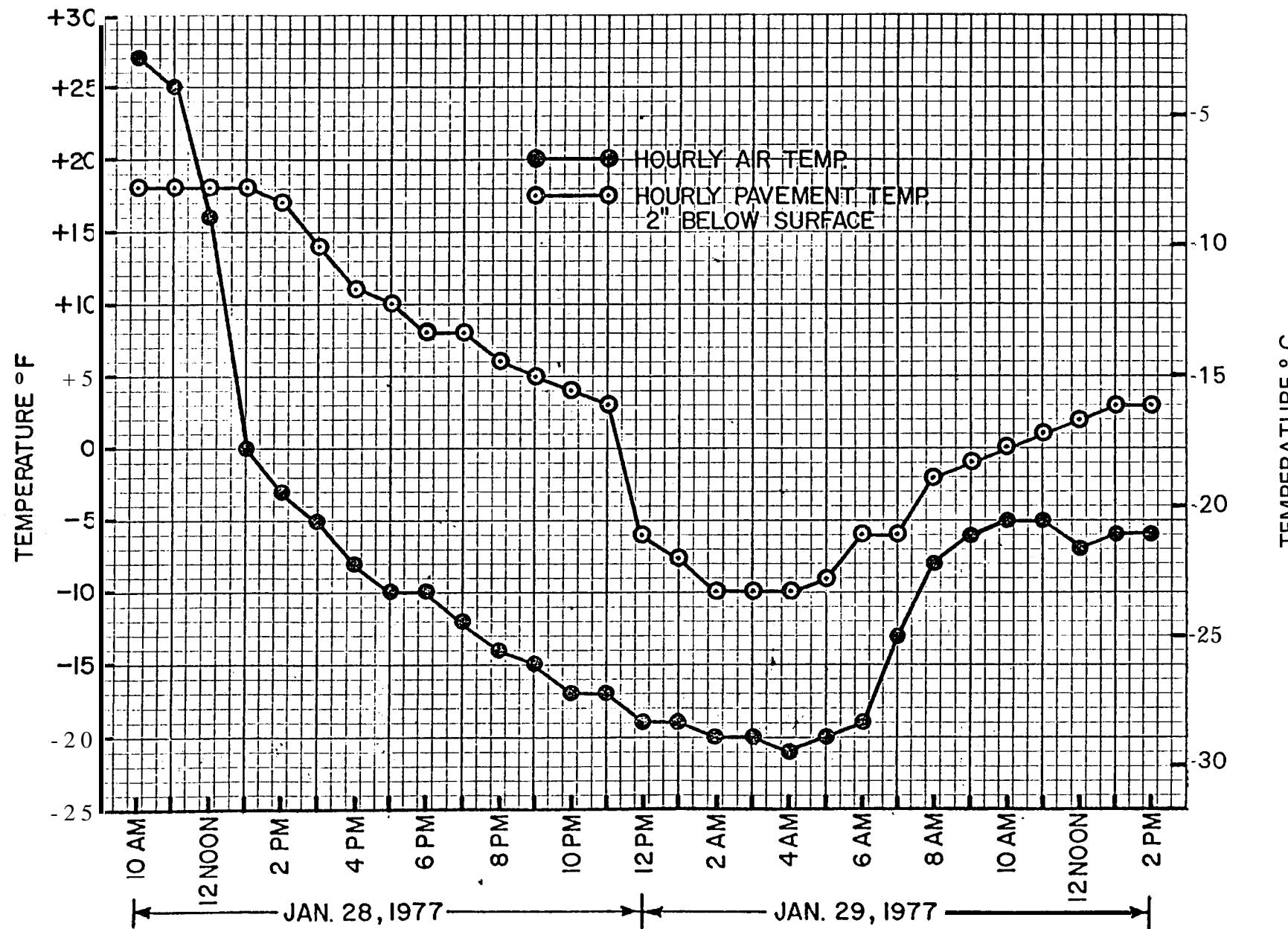


FIGURE 1. Hourly air and pavement temperature data (January 28-29, 1977)



FIGURE 2. Asphalt T-1 in both lanes showing transverse cracking

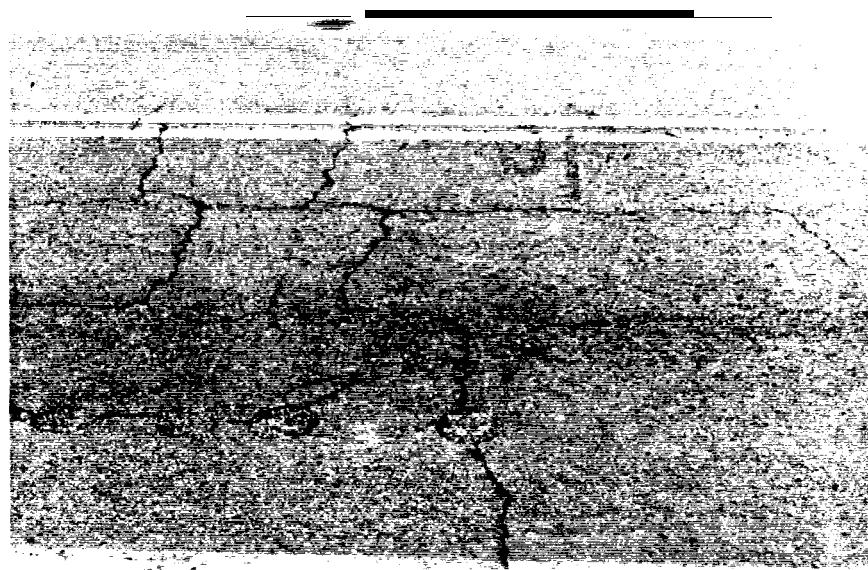


FIGURE 3. Asphalt T-1 (foreground lane) and Asphalt T-2 (background lane)



FIGURE 4. Asphalt T-5 in both lanes showing well-defined full- and half-width transverse cracks.

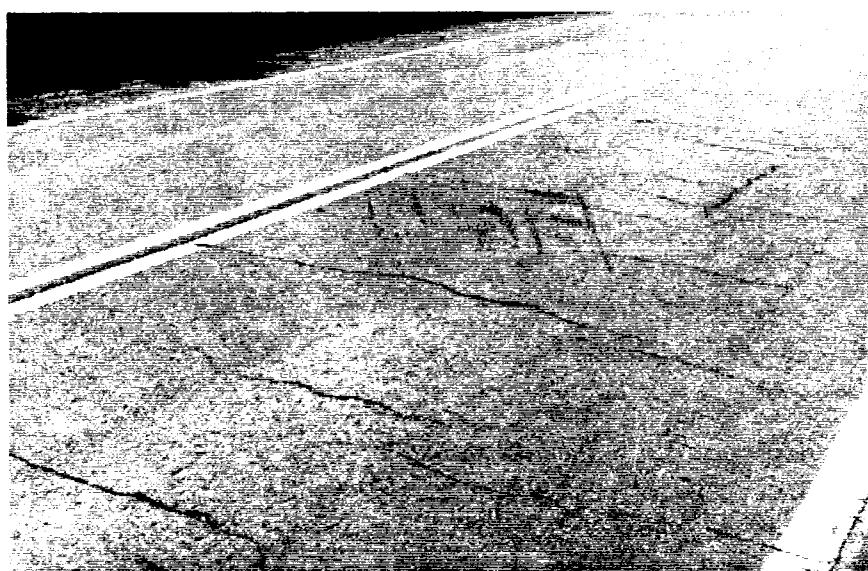


FIGURE 5. Asphalt T-5 (foreground lane) and Asphalt T-6 (background lane)

Kandhal, Dongre, and Malone
-29°C in January 1977

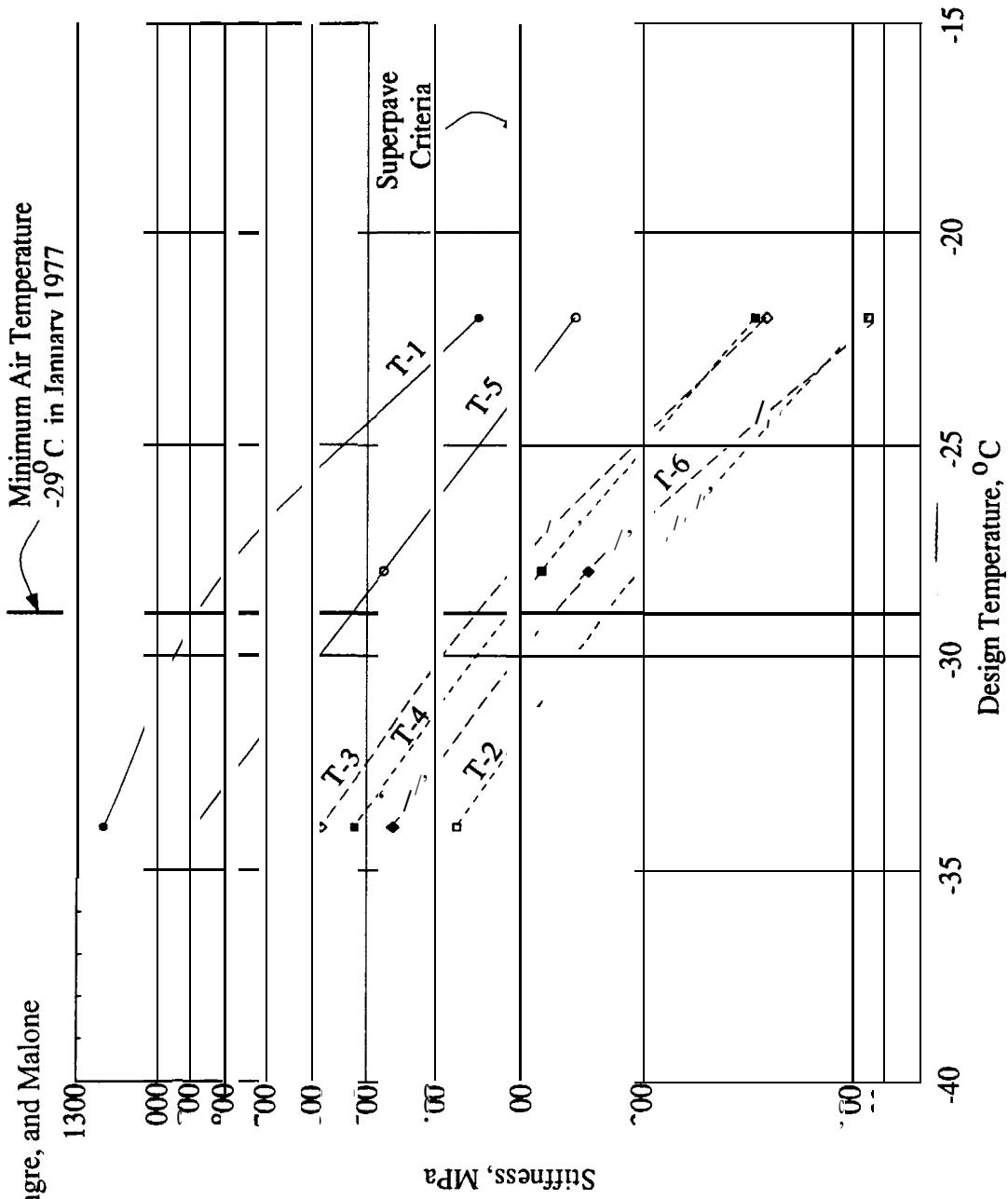
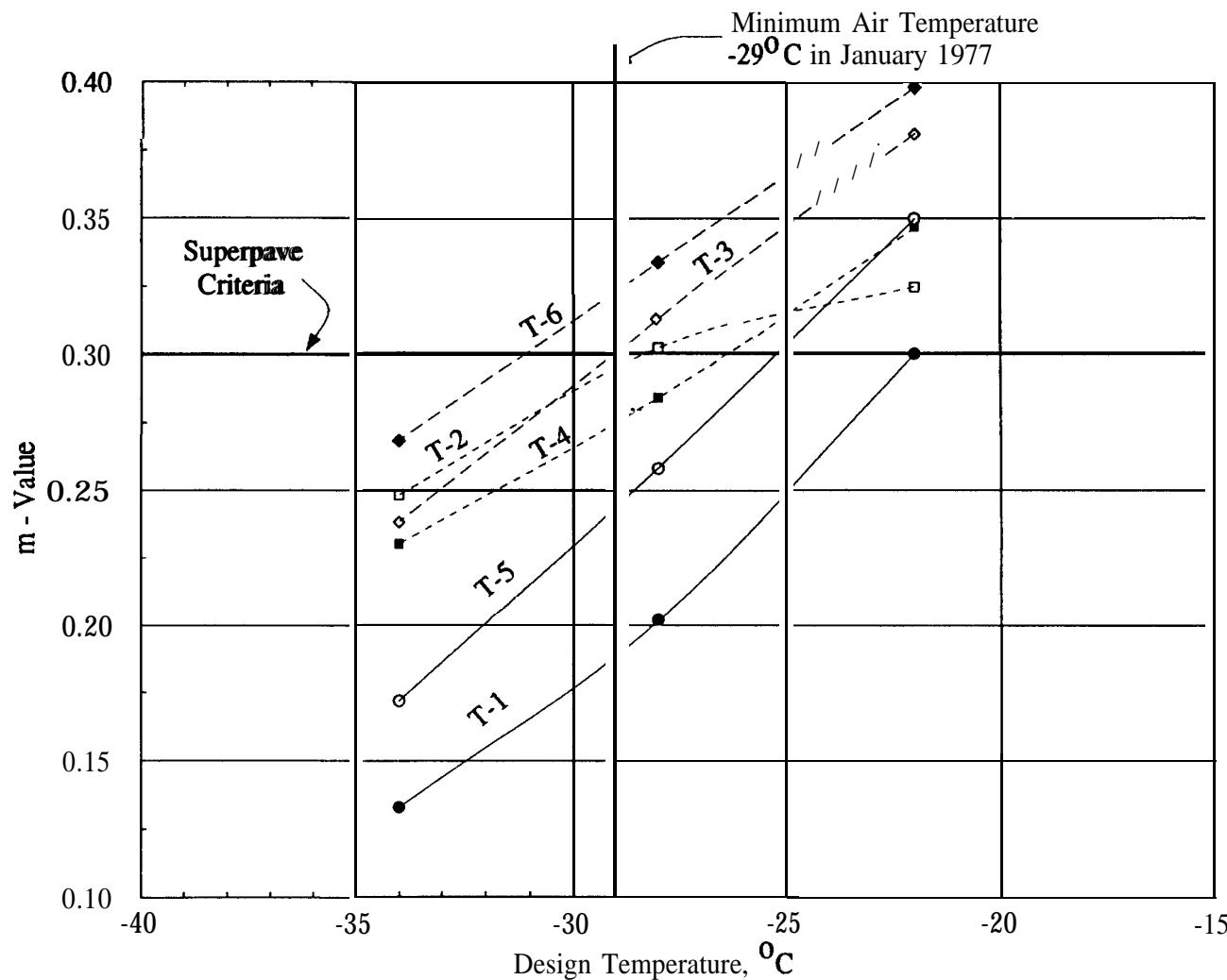


FIGURE 6. Stiffness of RTFOT residues

FIGURE 7. **m**-value of RTFOT residues

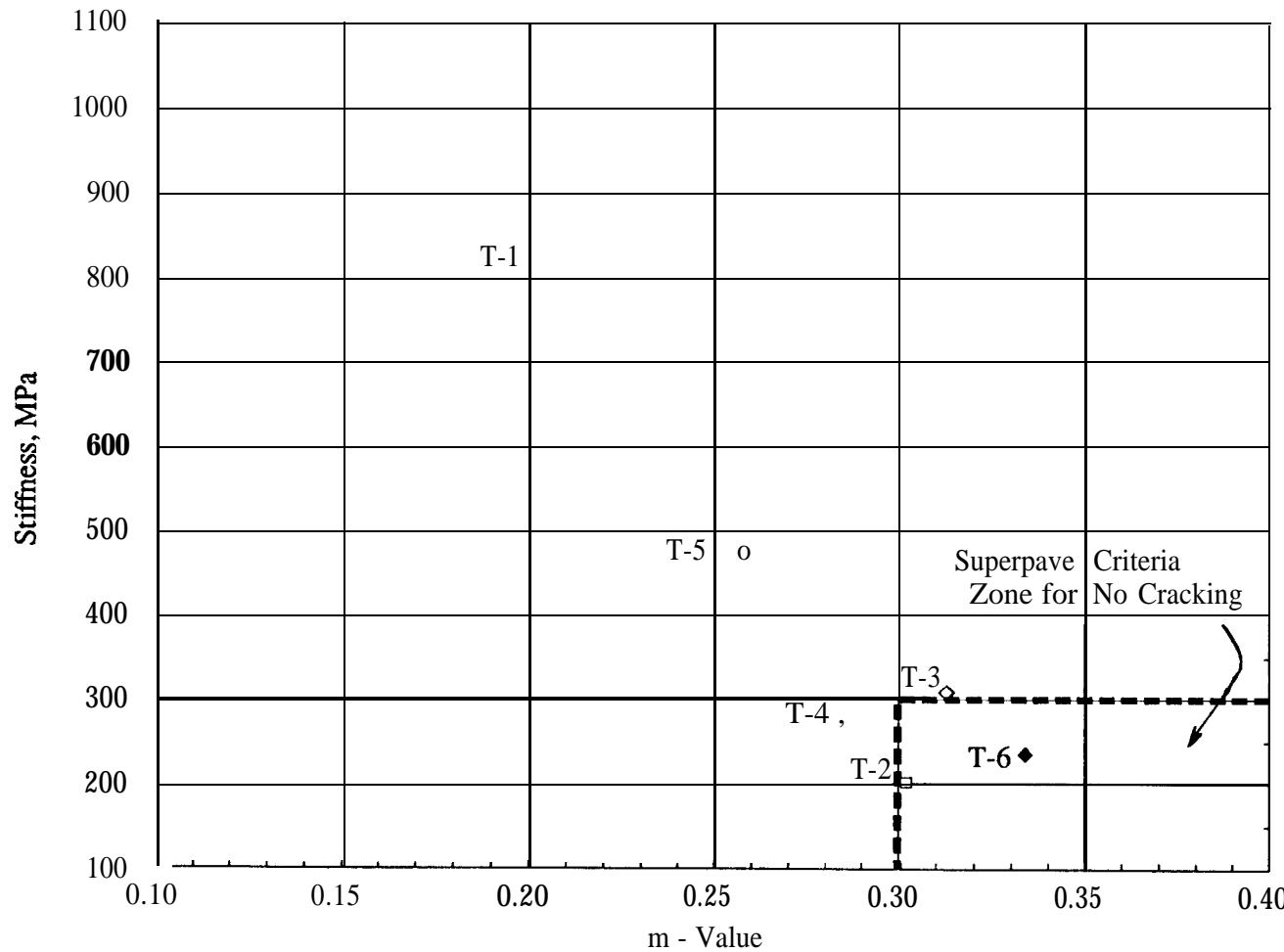


FIGURE 8. Stiffness and m-value at -28°C of RTFOT residues

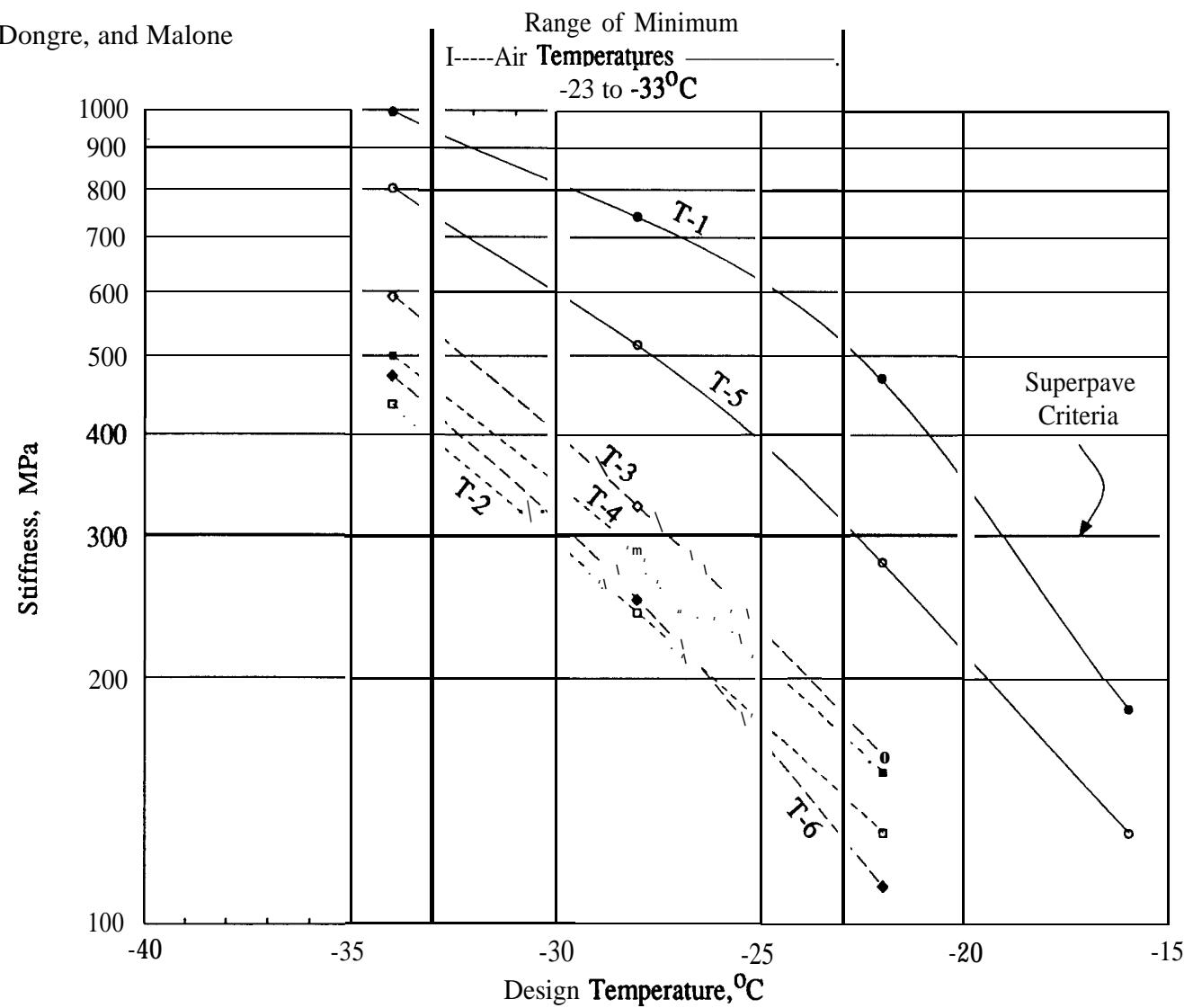
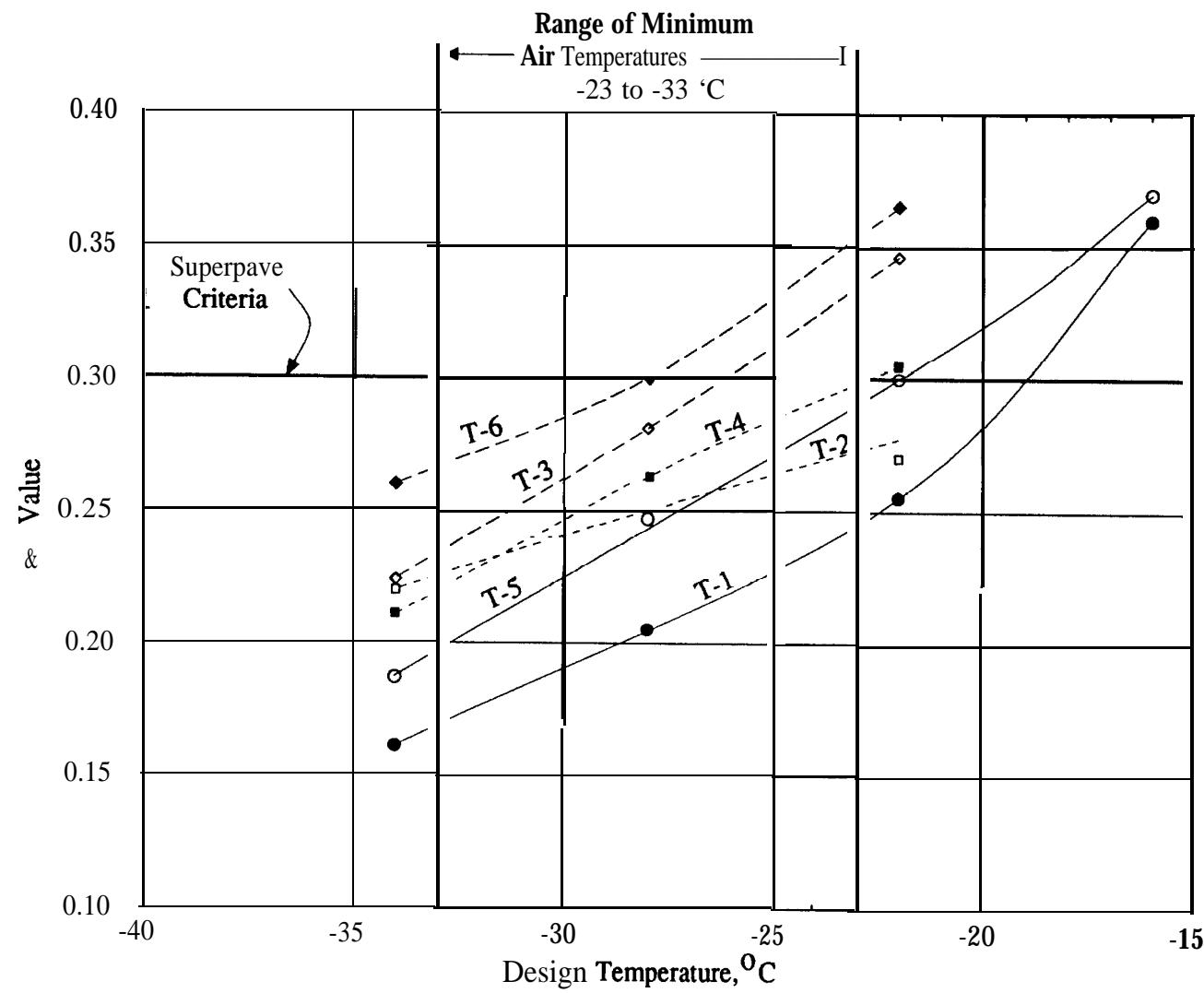


FIGURE 9. Stiffness of PAV residues

FIGURE 10. **m**-value of PAV residues

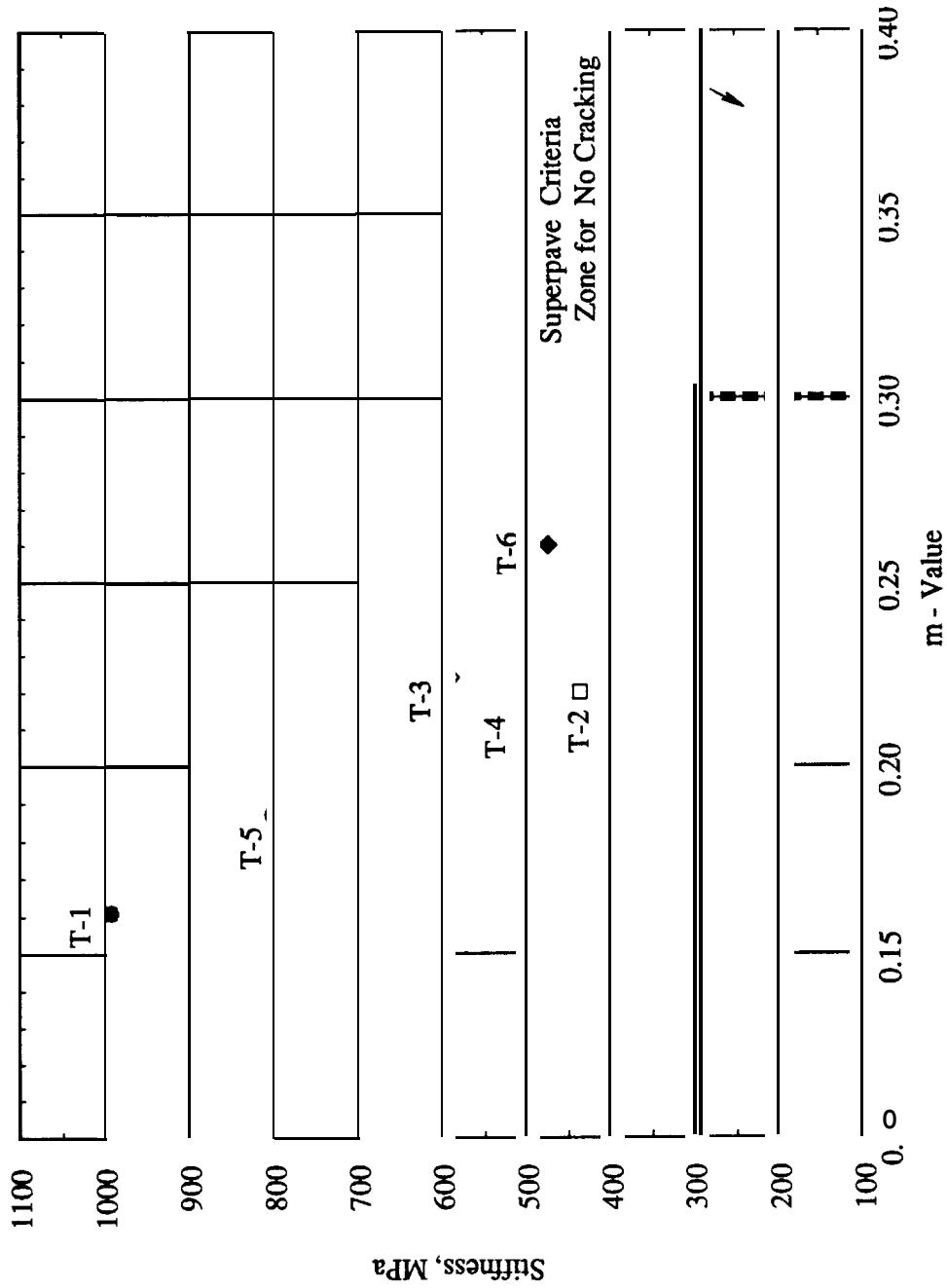


FIGURE 11. Stiffness and m-value at -34°C of PAV residues